**Customer Behavior Simulation using Agent Based Modelling**

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# **Topic:**

Using Agent Based Modelling along with equation based modelling to Simulate Customer Behavior

# **Objective:**

The objective of the study is to simulate the behavior of a customer population in a system with multiple vendors. The individual learning objectives are agent based modelling, discrete event simulation; object oriented programming using python, probability distribution etc.

# **Introduction:**

Agent based modelling (ABM) is a bottom up approach to understand the system behavior based on individual agent’s behavior. ABM simulates the behavior of the system based on attributes of the individuals. In ABM inferences will be made on system behavior based on individual attributes whereas in statistical modelling, inferences will be made on individuals based on the system behavior. The individuals can be single type or of multiple types with contradicting objectives. (Ex: Customers and Vendors, Migration of people, Forest growth with various animals etc.). The systems macroscopic results will be an aggregate of actions performed by individual agents based on their attributes.

# **Methodology:**

The methodology [1] of the study are as follows

1. Generate a population of customers having different combination of personal attributes such as sensitivity to reduced price, safety, cleanliness, distance to workplace, eagerness to grab an offer, time of purchase etc.
2. Generate a set of vendors (Ex: Hotels or Apartment complex) having different combination of attributes related to customer preferences and various kinds of offers at different times to gain maximum profits.
3. Simulate the behavior of customers in various scenarios and evaluate the strategies followed by vendors to gain maximum profit using agent based modelling.

The generated data will be further used to analyze various uplift modelling [2] techniques related to marketing campaigns.

# **Deliverables:**

The proposed study will help in identifying better marketing strategies for vendors in various service sectors. It will also help in identifying strategies that have to be followed in various demand supply scenarios. For example, may have to follow different pricing strategy if demand is more than supply and vice versa. Different pricing strategies can be modelled and evaluated using the above study. Data science techniques related to probability distributions, predictive and prescriptive analytics, discrete event simulation etc. via Python programming language will be used in this study.

# **References:**

1. Twomey, Paul, and Richard Cadman. "Agent-based modelling of customer behavior in the telecoms and media markets." *info* 4, no. 1 (2002): 56-63.

2. Radcliffe, N. J., and P. D. Surry. "Differential response analysis: Modeling true response by isolating the effect of a single action." *Credit Scoring and Credit Control VI. Edinburgh, Scotland* (1999).